

**GROUNDWATER INFORMATION SHEET**

**Lead**

*The purpose of this groundwater information sheet is to provide general information regarding a specific constituent of concern (COC). The following information is pulled from a variety of data sources and mainly relates to drinking water. For additional information, the reader is encouraged to consult the references cited at the end of the information sheet.*

<b>GENERAL INFORMATION</b>	
<b>Constituent of Concern</b>	Lead (Pb)
<b>Aliases</b>	None
<b>Chemical Formula</b>	Pb
<b>CAS No.</b>	7439-92-1
<b>Storet No.</b>	01049 (dissolved), 01051 (total)
<b>Summary</b>	The California Department of Public Health (CDPH) regulates lead as a drinking water contaminant. The current State Notification Level (NL) for lead, set by CDPH and the United States Environmental Protection Agency (US EPA), is 15 µg/L (0.015 mg/L). The most prevalent sources of lead in drinking water are corrosion of household plumbing systems and erosion of natural deposits. Historically, lead has been used in household paints, as a gasoline additive, in soldering compounds, and in metal piping. As of July 2010, 493 drinking water wells (of 9,935 sampled) have had concentrations of lead above the NL. Most lead detections above the NL have occurred in Kern, San Bernardino, and Santa Clara counties.

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<b>REGULATORY AND WATER QUALITY LEVELS<sup>1</sup></b>		
<b>Type</b>	<b>Agency</b>	<b>Concentration</b>
Federal Action Level (AL) <sup>2</sup>	US EPA	15 µg/L
State Notification Level (NL) <sup>2</sup>	CDPH	15 µg/L
Detection Limit for Purposes of Reporting (DLR)	CDPH	5 µg/L
Others:		
CA Public Health Goal (PHG)	OEHHA	0.2 µg/L
Cancer Potency Factor (1/10 <sup>6</sup> cancer risk)	OEHHA	4.1 µg/L

<sup>1</sup>These levels generally relate to drinking water, other water quality levels may exist. For further information, see *A Compilation of Water Quality Goals* (Marshack, 2008).

<sup>2</sup> The lead Action Level (AL) and Notification Level (NL) function similarly to a maximum contaminant level (MCL), but with additional testing requirements. If more than 10% of samples collected at the point of delivery exceed the AL/NL, the water distributor must take steps to reduce the corrosivity and/or lead concentrations of the delivered water.

<b>SUMMARY OF DETECTIONS IN PUBLIC DRINKING WATER WELLS<sup>3,4</sup></b>	
<b>Detection Type</b>	<b>Number of Groundwater Sources</b>
Number of active and standby public drinking water wells that have had a lead concentration > 15 µg/L.	493 of approximately 9,935 sampled
Top 3 counties with active and standby public drinking water wells that have had lead concentrations >15 µg/L.	Kern (77), Santa Clara (41), San Bernardino (34)

<sup>3</sup>Based on CDPH database query dated July 2010 using GeoTracker GAMA.

<sup>4</sup>In general, drinking water from active and standby wells is treated or blended so consumers are not exposed to water exceeding MCLs. Individual domestic wells and wells for small water systems not regulated by CDPH are not included in these figures.

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<b>ANALYTICAL INFORMATION</b>		
<b>Method</b>	<b>Detection Limit (Quantitation Limit)</b>	<b>Note</b>
<b>EPA 200.8</b>	0.015 µg/L	CDPH approved for public drinking water systems
<b>EPA 200.9</b>	0.015 µg/L	CDPH approved for public drinking water systems
<b>Public Drinking Water Testing Requirements</b>	Public water systems are required to test for lead on a schedule established by CDPH. Public supply systems must also periodically sample water at the point of delivery (generally, in household taps); if more than 10% of the taps exceed the Notification Level, the supplier must begin efforts to reduce lead concentrations at the point of delivery.	

<b>OCCURRENCE</b>	
<b>Anthropogenic Sources</b>	<p>There are several significant anthropogenic sources of lead in drinking water, including pipes, solder, brass fixtures and faucets, and other types of plumbing fittings. Prior to 1978, leaded gasoline was a major source of lead to the environment. Exhaust and lead particulates from this gasoline were transported to the atmosphere, surface water, and groundwater. Other sources of lead to water include fishing equipment (sinkers), car batteries, and some food cans. Dust – both indoor and outdoor – can contain significant amount of lead from both natural and anthropogenic sources.</p> <p>The amount of lead in your tap water will depend on several factors, including the age and material of your pipes, concentration delivered by the public utility (or, if you are a private domestic well owner, the concentration of the raw groundwater), and corrosivity (acidity, temperature, and the concentration of other mineral components) of the water. More corrosive water can cause greater leaching from pipes. According to the US EPA, newer homes will typically have higher lead concentrations. As a home and pipes age, mineral deposits will form a coating on the inside of the pipes and protecting against further corrosion. However, older homes with lead pipes can still have significant concentrations of lead in their tap water.</p> <p>Paint is an additional source of household lead. Lead was used extensively in paint pigments prior to 1960. After 1960, use of lead paints decreased significantly. Lead paint was banned in 1978. Dust and paint chips from leaded paints can be a significant source of lead to children; however, the contribution of lead to groundwater and drinking water from paint is not believed to be significant.</p>
<b>Natural Sources</b>	<p>Lead naturally occurs in rocks and mineral deposits that have varying degrees of solubility. Leaching of those rocks and minerals can cause elevated lead concentrations in groundwater.</p> <p>Groundwater contamination from “natural” lead sources is thought to be rare in California. The majority of detections of lead above the NL are very likely the result of leaching from pipes and plumbing. Lead detected in public water supply</p>

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	<p>wells may likely come from materials used in the construction of the well (for example, casing, solder, and pump machinery), and may not reflect ambient (natural) background water quality.</p>
<b>History of Occurrence</b>	<p>Historically, lead was used extensively in piping, as a component of solder, in brass fittings, and in some types of faucets and fixtures. Plumbing installed prior to 1930 typically contained some lead. Copper pipes have replaced lead pipes in most residential buildings – however, lead solder was often used with copper pipes. The US EPA regards lead solder as a major cause of lead contamination in household water. Recognition that lead from pipes and solder could contribute to childhood developmental delays resulted in laws limiting the amount of lead in household plumbing. The US EPA required lead-free plumbing in 1988.</p> <p>In 1991, the US EPA established the 15 µg/L Federal Action Level. California followed in 1995 with its Action Level (now Notification level) of 15 µg/L. In January 2010, California updated laws mandating “lead-free” piping and soldering materials for use in households.</p>
<b>Contaminant Transport Characteristics</b>	<p>Metallic (elemental) lead dissolves into water relatively easily. Once dissolved, lead remains dissolved and can be transported long distances.</p>

## **REMEDATION & TREATMENT TECHNOLOGIES**

Lead remediation is usually not practicable in groundwater, since most lead in drinking water usually comes from household sources (pipes, fittings, solder). However, there are several methods and actions that are effective in reducing the lead concentration in drinking water:

**Filters:** Some household faucet or pitcher filters will remove lead from drinking water. The label on the filter should be checked to ensure that it is certified for lead removal.

**Run the Water:** One of the most effective techniques to reduce lead concentrations in your tap water is to let the faucet run for 30 seconds to two minutes before using the water for drinking, cooking, or brushing your teeth. If the water has sat in your house's plumbing or piping for more than about six hours, the water run will help to flush out lead that has leached from household pipes. Usually, the water will change temperature once the pipes have flushed.

**Boiling WILL NOT Remove Lead:** Boiling water with lead in it will not remove the lead – in fact, boiling water will slightly increase lead concentrations.

**Use Cold Water For Cooking and Drinking:** Use only cold water for cooking or consumption. Hot water can more easily leach lead from pipes. If hot water is required for cooking, use cold water and heat that water on a stovetop or in a microwave. Do not use hot tap water to make instant drinks, tea, coffee, or baby formula.

**Test Your Water:** If you are concerned, the only way to confirm the presence of lead is to test your drinking water. Most public utility systems are required to test for lead, and cannot deliver water with lead concentrations greater than the NL (15 µg/L). However, this testing does not reflect lead conditions at the point of delivery (at your tap). Additional corrosion or leaching can occur within your household plumbing. Tests from a certified laboratory typically cost 20 to 100 dollars. A list of California-certified laboratories is available at:  
<http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx> or on the GAMA Program Website at: [http://www.waterboards.ca.gov/gama/domestic\\_wells\\_testing.shtml](http://www.waterboards.ca.gov/gama/domestic_wells_testing.shtml). Some over-the-counter testing kits are also available that provide a relative picture of the lead concentration in your tap water.

<b>HEALTH EFFECT INFORMATION</b>
<p>Health effects of lead are most significant for infants and children. Children under the age of six are most sensitive to lead in drinking water. Lead exposure can result in physical and mental developmental delays. Pregnant women should also limit lead consumption due to possible fetal developmental effects. The US EPA estimates that 10 to 20 percent of the total lead exposure for young children comes from drinking water. In infants whose diet consists mainly of liquids, as much as 40 to 60 percent of their lead exposure can come from drinking water.</p> <p>For adults, high lead concentrations in drinking water can result in high blood pressure or kidney problems. Lead is also classified as a probable human carcinogen.</p>

**ADDITIONAL RESOURCES**  
**LEAD IN DRINKING WATER**

There are many on-line resources with additional information about lead in drinking water and the environment. Links to these websites are provided below, organized by agency:

**The US Environmental Protection Agency (US EPA)**

- <http://www.epa.gov/OGWDW/lead/index.html>
- <http://www.epa.gov/OGWDW/lead/lead1.html>
- [http://www.epa.gov/OGWDW/lcrmr/fs\\_consumer.html](http://www.epa.gov/OGWDW/lcrmr/fs_consumer.html)
- <http://www.epa.gov/lead/>

**Center for Disease Control (CDC)**

- <http://www.cdc.gov/healthywater/drinking/private/wells/disease/lead.html>

**LA County Department of Public Health**

- [http://www.lapublichealth.org/tox/lead\\_FAQ.htm](http://www.lapublichealth.org/tox/lead_FAQ.htm)
- [http://www.lapublichealth.org/tox/lead\\_in-depth.htm](http://www.lapublichealth.org/tox/lead_in-depth.htm)

**Agency for Toxic Substances and Disease Registry**

- <http://www.atsdr.cdc.gov/tfacts13.pdf>
- <http://www.atsdr.cdc.gov/tfacts13.html>

**California Department of Public Health (CDPH)**

- <http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx>
- <http://www.cdph.ca.gov/certlic/drinkingwater/Pages/NotificationLevels.aspx>

**Department of Toxic Substances Control (DTSC)**

- <http://www.dtsc.ca.gov/PollutionPrevention/upload/Lead-in-Plumbing-Fact-Sheet.pdf>

**Office of Environmental Health Hazard Assessment (OEHHA)**

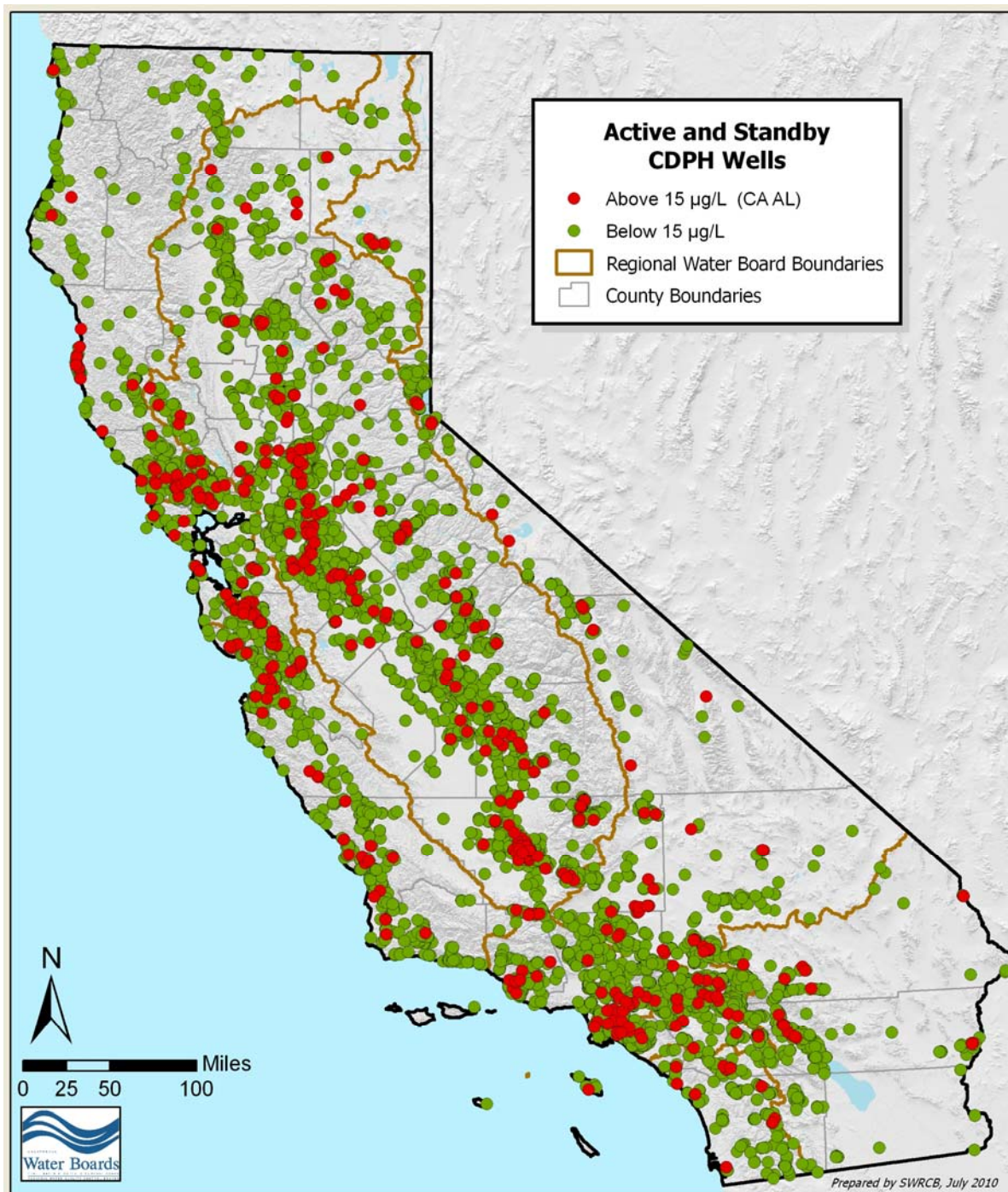
- <http://oehha.ca.gov/water/phg/042409phgs3.html>
- <http://oehha.ca.gov/water/phg/pdf/LeadfinalPHG042409.pdf>

**FOR MORE INFORMATION, CONTACT:**

**John Borkovich, GAMA Program Manager (916) 341-5779**



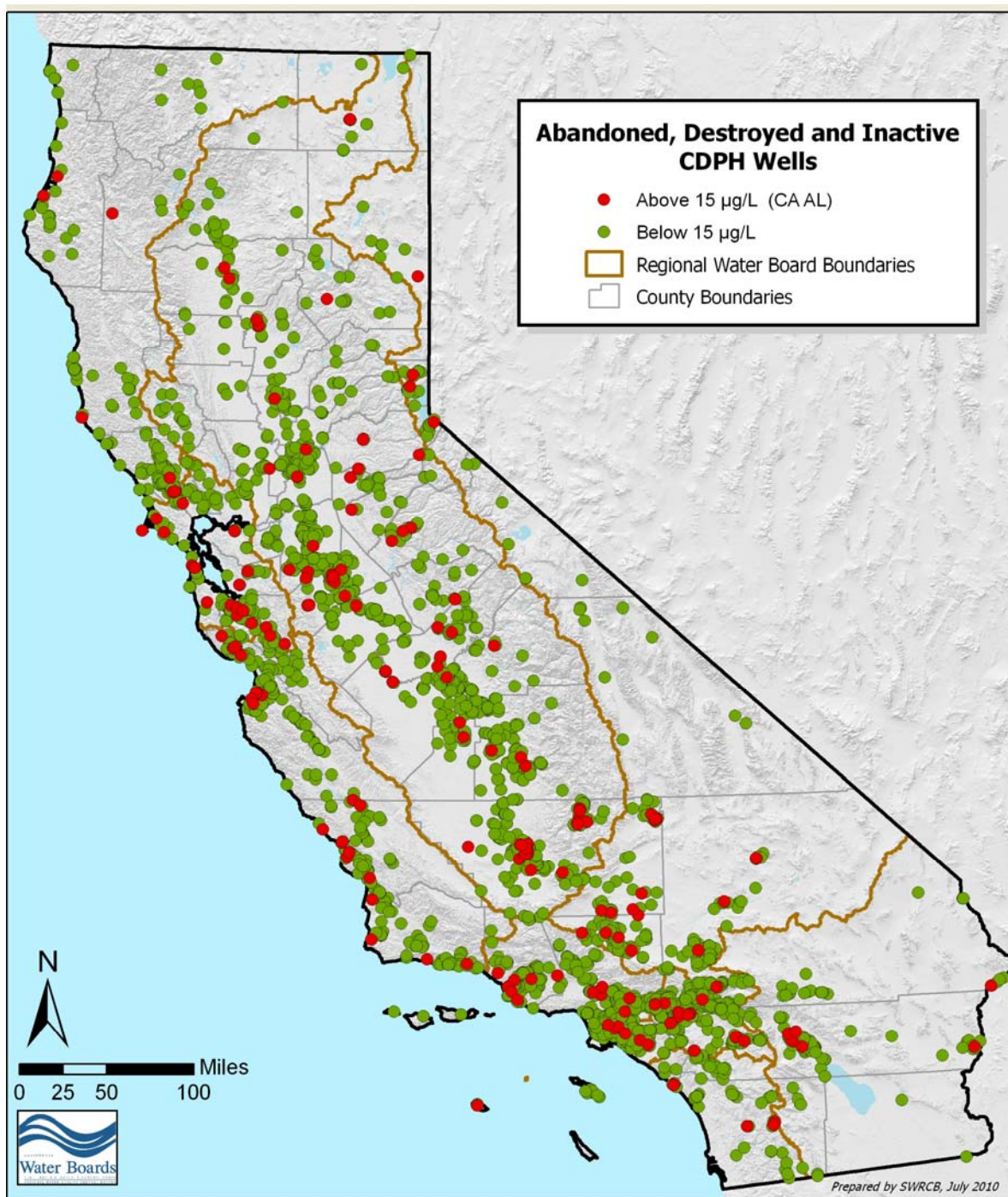
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**Active and Standby CDPH Wells that have had at Least One Detection of Lead above the Notification Level (493).**

Source: July 2010 well query of CDPH data using GeoTracker GAMA

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**Abandoned, Destroyed, and Inactive CDPH Wells that have had at Least One Detection of Lead above the Notification Level (201 Wells).**

Source: July 2010 well query of CDPH data using GeoTracker GAMA